

Claims:

SUB A17

1. A data warehouse system, comprising:
 - at least one client for accepting a processing request from a user;
 - at least one server provided with a database respectively and used for searching said database according to an access request from said client;
 - at least one data collector for collecting data requested by said user;
 - a database for storing data collected by said data collector; and
 - a network for connecting said client to a desired server via said data collector; wherein
 - said data collector includes;
 - a client management unit for managing at least one client;
 - a query analysis unit for analyzing a request from said client;
 - a replica creation request analysis unit for analyzing each replica creation request from said client;
 - a communication control unit for deciding a procedure for accessing at least one of said servers according to the analysis result from said query analysis unit; and
 - a replica creation management unit for creating a replica according to an analyzed creation request and

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managing said replica using a replica management table which corresponds the content of said created replica to the information related to the location of said replica stored in said database; and

said server includes;

a communication control unit for receiving a query analysis result transmitted from at least one of a plurality of said data collectors; and

a query processing unit for searching the database of each server and creating a response to said received query analysis result.

2. A data warehouse system, comprising:

at least one client for accepting a processing request from a user;

at least one server provided with a database respectively and used for searching said database according to an access request from said client;

at least one data collector for collecting data requested by said user; and

a database for storing data collected by said data collector; wherein

said data collector includes;

a replica creation request analysis unit for analyzing a replica creation request from said client;

005011-10052100

a client management unit for grouping a plurality of clients which can share data according to an analyzed creation request and managing a plurality of said clients; and

a replica creation management unit for creating a replica according to an analyzed creation request and managing said replica using a replica management table which corresponds the content of said created replica to the information related to the location of said replica stored in said database;

3. A data warehouse system in accordance with claim 1, wherein

said replica creation management unit includes a program creation unit for creating a program for receiving a replica creation request dynamically from ^asaid client ^{device} by combining software parts received via said network.

SUB AZ 7 4. A data warehouse system, comprising:

at least one client for accepting a processing request from a user;

at least one server provided with a database respectively and used for searching said database according to an access request from said client;

at least one data collector for collecting data requested by said user;

a database for storing data collected by said data collector; and

a network for connecting said client to a desired server via said data collector; wherein

said data collector includes;

a client management unit for managing at least one client;

a query analysis unit for analyzing a request from said client;

a replica creation request analysis unit for analyzing a replica creation request from said client;

a communication control unit for deciding a procedure for accessing at least one of a plurality of said servers according to the analysis result from said query analysis unit;

a replica creation request analysis unit for analyzing a replica creation request from said client; and

a replica creation management unit for creating a replica according to an analyzed creation request and managing said replica using a replica management table which corresponds the content of said created replica to the information related to the location of said replica stored in said database; and

said server includes;

2014-11-17 14:17:59

a communication control unit for receiving a query analysis result transmitted from at least one of a plurality of said data collectors;

a query processing unit for searching the database of each server and creating a response to said received query analysis result;

a delivery data management table which includes the region condition, quality condition, delivery destination, and delivery method of the data to be delivered to said data collector; and

a delivery data management unit for managing said delivery data in accordance with said table.

5. A data warehouse system, comprising:

at least one client for accepting a processing request from a user;

at least one server provided with a database respectively and used for searching said database according to an access request from said client;

at least one data collector for collecting data requested by said user; and

a database for storing data collected by said data collector; wherein

said data collector includes;

a client management unit for managing at least one client;

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a query analysis unit for analyzing a request from said client;

a communication control unit for deciding a procedure for accessing at least one of said servers according to an analysis result from said query analysis unit;

a replica creation request analysis unit for analyzing a replica creation request from said client; and

a replica creation management unit for creating a replica according to an analyzed creation request and managing said replica using a replica management table which corresponds the content of said created replica to the information related to the location of said replica stored in said database; and

said server includes:

a communication control unit for receiving a query analysis result transmitted from at least one of a plurality of said data collectors;

a query processing unit for searching the database of each server and creating a response to said received query analysis result;

a delivery data management table which includes the region condition, quality condition, delivery destination, and delivery method of the data to be delivered to said data collector;

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a delivery data management unit for managing said delivery data in accordance with said table; and

a load management unit for managing the load information of said server and estimating the server load when processing a delivery request accepted newly for said delivery data.

6. A data warehouse system, comprising:

at least one client for accepting a processing request from a user;

at least one server provided with a database respectively and used for searching said database according to an access request from said client;

at least one data collector for collecting data requested by said user; and

a database for storing data collected by said data collector; wherein

said data collector includes;

a client management unit for managing at least one client;

a query analysis unit for analyzing a request from said client;

a replica creation request analysis unit for analyzing a replica creation request from said client;

a communication control unit for deciding a procedure for accessing at least one of a plurality of said servers

according to the analysis result from said query analysis unit;

a replica creation request analysis unit for analyzing a replica creation request from said client; and

a replica creation management unit for creating a replica according to an analyzed creation request and managing said replica using a replica management table which corresponds the content of said created replica to the information related to the location of said replica stored in said database; and

said server creates a replica in said data collector before processing a query from a client, according to a replica creation request to which said client gives part or the whole of the data to access when in processing of a query.

A 7. A data warehouse system in accordance with claim 5/₁ wherein

A said data collector includes/₁

A a data collector negotiation unit for ^{determining} deciding data for which a replica is to be created through a negotiation with said server according to ^a said replica creation request, computer resources usable by said data collector and by said server when a replica is to be created in said replica creation management unit.

A 8. A data warehouse system in accordance with claim 6/₁ wherein

A said server includes ¹/_A

a server negotiation unit for negotiating with said data collector according to server load information estimated by said load management unit, computer resources usable by said server and by said data collector.

SUB A37

9. A data warehouse system, comprising:

at least one client for accepting a processing request from a user;

at least one server provided with a database respectively and used for searching said database according to an access request from said client;

at least one data collector for collecting data requested by said user; and

a database for storing data collected by said data collector; wherein

said data collector includes;

a client management unit for managing at least one client;

a query analysis unit for analyzing a request from said client;

a communication control unit for deciding a procedure for accessing at least one of said servers according to the analysis result from said query analysis unit;

a replica creation request analysis unit for analyzing a replica creation request from said client, said

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request including at least one of the conditions for specifying the range, precision, freshness, and priority of the data to be accessed by said client; and

a replica creation management unit for creating a replica according to an analyzed creation request and managing said replica using a replica management table which corresponds the content of said created replica to the information related to the location of said replica stored in said database.

10. A data warehouse system in accordance with claim 9; wherein

said server includes;

a data extraction unit for extracting data for a replica creation request including a condition for specifying a data precision through any of the following processings according to the object data type.

(1) Sampling or extracting each field for record data in cooperative databases

(2) Creating a summary or extracting of each keyword for text data

(3) Reversible compression, irreversible compression, frame extraction, reduction of colors, reduction of resolution, or contraction in size for still picture image data

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(4) Reduction of frames or compression of picture images in each frame for dynamic picture image data

(5) Reduction of sampling rates, adjustment of sound quality, or conversion to character data for voice data.

11. A data warehouse system, comprising:

at least one client for accepting a processing request from a user;

a plurality of servers provided with a database respectively and used for searching said database according to an access request from said client;

at least one data collector for collecting data requested by said user; and

a database for storing data collected by said data collector; wherein

said data collector includes;

a client management unit for managing at least one client;

a query analysis unit for analyzing a request from said client;

a communication control unit for deciding a procedure for accessing at least one of a plurality of said servers according to the analysis result from said query analysis unit;

a replica creation request analysis unit for analyzing a replica creation request from said client; and

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a replica creation management unit for creating a replica according to an analyzed creation request and managing said replica using a replica management table which corresponds the content of said created replica to the information related to the location of said replica stored in said database; and

said replica creation management unit includes;

a data collector negotiation unit for negotiating with said server to decide data for which a replica is to be created according to said replica creation request and computer resources usable by said data collector and said server;

said server includes;

a communication control unit for receiving a query analysis result transmitted from at least one of a plurality of said data collectors;

a server negotiation unit for negotiating with said data collector for replica creation conditions according to computer resources usable by said server; and

a query processing unit for searching a database at said server side and create a response to a received query analysis result.

12. A data warehouse system in accordance with claim

A 11¹/_A wherein

A said server¹/_A includes¹/_A further¹/_A :

a load management unit for estimating the load of said server when accepting and processing a new request for creating a replica of delivery data.

A 12/A 13. A data warehouse system in accordance with claim wherein

A said server negotiation unit includes a processing unit for negotiating with said data collector according to computer resources including ~~the~~ load information of said server estimated by said load management unit as computer resources usable by said server.

A 11/A 14. A data warehouse system in accordance with claim wherein

A said server negotiation unit includes 1/A indicating
A a response processing unit for returning a response of whether to accept said replica creation request or reject or accept said replica creation request on a condition.

A 14/A 15. A data warehouse system in accordance with claim wherein

A said response processing unit includes 1/A
a transfer unit for giving a new condition generated by updating the condition of said replica creation request to a response accepted on a condition, then transferring said response with a new condition to said data collector.

A 15/A 16. A data warehouse system in accordance with claim wherein

said data collector negotiation unit includes a processing unit for giving said new condition transferred and combined with said response to said client^{device}.

A 11/A 17. A data warehouse system in accordance with claim 11/A wherein

said replica creation management unit includes an addition unit for adding conditions and information to said replica management table, said conditions and information including the data region, data quality, storing location information, and delivery method of said replica created as a result of said negotiation.

A 11/A 18. A data warehouse system in accordance with claim 11/A wherein

said delivery data management unit includes an addition unit for adding conditions and information to said delivery data management table, said conditions and information including the region, quality, destination, and delivery method of the data decided to be supplied as a result of said negotiation.

SUB A47

19. A data warehouse system, comprising:
at least one client for accepting a processing request from a user;

at least one server provided with a database respectively and used for searching said database according to an access request from said client;

at least one data collector for collecting data requested by said user;

a database for storing data collected by said data collector; and

a network for connecting each client to its desired server via said data collector; wherein

said data collector includes;

a client management unit for managing at least one client;

a query analysis unit for analyzing a request from said client;

a query processing unit for processing a query analyzed in said query analysis unit;

a communication control unit for deciding a procedure for accessing at least one of said servers connected to said network according to the analysis result from said query analysis unit;

a replica creation request analysis unit for analyzing a replica creation request from said client; and

a replica creation management unit for creating a replica according to an analyzed creation request and managing said replica using a replica management table which corresponds the content of said created replica to the information related to the location of said replica stored in said database; and

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said server includes;

a communication control unit for receiving a query analysis result transmitted from at least one of a plurality of said data collectors through said network;

a query processing unit for searching a database at said server side and create a response to a received query analysis result; and

means for controlling so that at least either said server or said data collector can select whether to delivery data under the control of said server or said data collector.

20. A data warehouse system, comprising:

at least one client for accepting a processing request from a user;

at least one server provided with a database respectively and used for searching said database according to an access request from said client;

at least one data collector for collecting data requested by said user;

a database for storing data collected by said data collector; and

a network for connecting each client to its desired server via said data collector; wherein

said data collector includes;

a client management unit for managing at least one client;

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a query analysis unit for analyzing a request from said client;

a communication control unit for deciding a procedure for accessing at least one of said servers connected to said network according to an analysis result from said query analysis unit;

a replica creation request analysis unit for analyzing a replica creation request from said client; and

a replica creation management unit for creating a replica according to an analyzed creation request and managing said replica using a replica management table which corresponds the content of said created replica to the information related to the location of said replica stored in said database; and

said query analysis unit includes;

a processing location decision unit for deciding a data collector which processes said query using said replica management table;

a replica usability decision unit for deciding whether or not a query can be processed using a replica stored in a data collector which should process said query;

a processing unit for directing said query processing unit for a query processing using said replica without transferring any query to said server if said query

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processing is decided possible using said replica in said data collector; and

a transfer unit for transferring said query to said server if said query processing is decided impossible using said replica stored in said data collector.

21. A data warehouse system in accordance with claim 20; wherein

said processing location decision unit includes;

a processing unit for deciding as a result of said query analysis unit whether or not the same value is taken in both said query and said replica or one of them includes the other; and

a processing unit for deciding said position using said relationship of the same value or inclusion and said replica management table.

22. A data warehouse system in accordance with claim 20; wherein

said processing location decision unit includes;

a processing unit for deciding as a result of said query analysis unit whether or not the same value is taken in both said query and said replica or one of them includes the other;

a processing unit for judging whether or not the same value is taken in both said query and said replica or one of them includes the other;

a processing unit for deciding said data collector in which said replica exists as a location to process said query if said relationship is decided "yes"; and

a processing unit for deciding said server as said location to process said query if said relationship is decided "no".

23. A data warehouse system in accordance with claim 21, wherein

said processing unit for deciding that the same value is taken in both said query and said replica or one of them includes the other includes

A a unit for ^{determining} deciding that the same value is taken in both using the Query Equivalent Decision Method; and

A a unit for ^{determining} deciding that one of them includes the other using the Query Containment Decision Method.

SUB A5> 24. A data warehouse system, comprising:

at least one client for accepting a processing request from a user;

at least one server provided with a database respectively and used for searching said database according to an access request from said client;

at least one data collector for collecting data requested by said user;

a database for storing data collected by said data collector; and

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~~said data collector includes;~~

~~a query analysis unit for analyzing a request from
said client;~~

a replica creation request analysis unit for analyzing a replica creation request from said client; and

a replica creation management unit for creating a replica according to an analyzed creation request and managing said replica so that said replica can be shared among said cooperative data collectors when in processing said query using a replica management table which corresponds the content of said created replica to the information related to the location of said replica stored in said database; and

a communication control unit for receiving a query analysis result transmitted from at least one of said cooperative data collectors through said network; and

25. A data warehouse system in accordance with claim 9, wherein

A said replica creation request analysis unit includes
a processing unit for handling data in said data
collector as the latest data at the current time if said
replica creation request includes a condition for
specifying freshness of data and the difference between the
updating time when data is updated in said server and the
current time is small.

26. A data collector used for a data warehouse,
comprising:

A a client management unit for managing at least one client ^{device} and collecting data requested by said client; ^{device}

a query analysis unit for analyzing each query request
A from said client;
device

A a replica creation request analysis unit for analyzing a replica creation request included in ^{an}~~said~~ analyzed query request;

a database for storing each replica created according to an analyzed creation request; and

a replica creation management unit for creating a replica according to an analyzed creation request and

A managing said replica using a replica management table which corresponds the content of a created replica to ~~the~~ information related to the storing location of said replica in said database.

A 27. A data collector which uses a general-purpose database management system for ~~said~~ ^{the} replica database in accordance with claim 26.

SUB A67 28. A method for collecting data used by a data warehouse, comprising;

a client management step for managing at least one client and collecting data requested by said client;

a query analyzing step for analyzing each query request from said client;

a replica creation request analyzing step for analyzing a replica creation request included in said query request;

a replica database storing step for storing a replica created according to said analyzed creation request; and

a replica creation managing step for creating a replica according to said analyzed creation request and managing said replica using a replica management table which corresponds the content of said created replica to the information related to the location of a replica stored in said replica database.

29. A method for collecting data used by a data warehouse, comprising;

a client management step for managing at least one client and collecting data requested by said client;

a query analyzing step for analyzing each query request from said client;

a replica creation request analyzing step for analyzing a replica creation request included in said query request;

a replica creation managing step for creating a replica according to said analyzed creation request and managing said replica using a replica management table which corresponds the content of said created replica to the information related to the location of a replica stored in said replica database; and

a query processing step for processing said analyzed query request using a replica managed by said replica management table.

30. A recording medium for recording a computer program used to execute said query processing method using a computer in accordance with claim 28 or 29.

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SUB A77

31. A data warehouse system, comprising:

at least one client for accepting a processing request from a user;

~~a network for connecting each client to its desired server; and~~

a database for storing data collected by said data collector; wherein

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        a client management unit for managing at least one
client;

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a communication control unit for deciding a procedure for accessing at least one of a plurality of said servers connected to said network according to an analysis result from said query analysis unit;

a replica creation management unit for creating a replica according to an analyzed creation request and managing said replica using a replica management table which corresponds the content of said created replica to the

information related to the location of said replica stored in said database; and

said server includes;

a communication control unit for receiving a query analysis result transmitted from at least one of a plurality of said data collectors through said network; and

a query processing unit for searching a database at said server side and creating a response to a received query analysis result.

32. A data warehouse system in accordance with claim 31, wherein

said replica creation management unit includes a program creation unit for creating a program for receiving each replica creation request from said client ^{device} by combining software parts received through said network.

SUB A8> 33. An accounting system used in a data warehouse, comprising;

a client managing unit for managing at least one client and collecting data requested from said client;

a replica creation request analysis unit for analyzing a replica creation request from said client; and

a replica creation management unit for creating a replica according to an analyzed creation request and managing said replica using a replica management table which corresponds the content of a created replica to the

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information related to the location of said replica stored in a database; wherein

said replica creation management unit includes;

a data collector side negotiation unit for negotiating with said server according to said replica creation request and computer resources usable by said data collector and by said server, thereby deciding data for which a replica is to be created, as well as a charge for said data; and

a server side negotiation unit for negotiating with said data collector for replica creation conditions including said charge according to computer resources usable by said server.

34. A method accounting used in a data warehouse, comprising;

a client managing step for managing at least one client and collecting data requested from said client;

a data collector side negotiating step for deciding data for which a replica is to be created, as well as a charge for said data through negotiation with said server according to said replica creation request and computer resources usable by both of said data collector and said server using a replica creation request analysis unit for analyzing a replica creation request from said client and a replica management table which corresponds the content of said

2025 RELEASE UNDER E.O. 14176

created replica to the information related to the location
of a replica stored in said replica database; and

a server side negotiating step for negotiating with
said data collector for a replica creation condition
including said charge according to computer resources
usable by said server.

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